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Medical and Orthopaedic Conditions in Special Olympics Athletes

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Objective: Many Special Olympics athletes experience hypokinetic diseases and comorbid conditions that may predispose them to serious injuries during physical activity. A clear understanding of these conditions and diseases may assist health care professionals in preventing further distress and managing the injuries sustained by these athletes. Such diseases and conditions include overweight and obesity, diabetes, vision problems, seizure disorders, and Down syndrome, which is often associated with atlantoaxial instability.

Data Sources: MEDLINE, SPORT Discus, and Special Olympics information sources for the years 1990–2000 using the key terms *Special Olympics*, *mental retardation*, *comorbidity*, *Down syndrome*, *hypokinetic diseases*, and *physical activity* were searched.

Data Synthesis: A basic review of hypokinetic diseases and comorbid conditions prepares health care professionals for working with people with mental retardation.

Conclusions and Recommendations: Health care volunteers at Special Olympics events treat athletes with mental retardation who may also have some of the comorbid conditions and hypokinetic diseases observed commonly in this population. Moreover, many of these conditions and diseases are typical in athletes without mental retardation. Athletic trainers should be familiar with these conditions and diseases but should review the unique conditions and prescription medications commonly found in the Special Olympics population before providing medical services for these athletes.

Key Words: mental retardation, comorbidity, Down syndrome, hypokinetic diseases, physical activity

The National Athletic Trainers' Association defines the physically active as ''individuals who engage in athletic, recreational, or occupational activities that require physical skills and utilize strength, power, endurance, speed, flexibility, range of motion, or agility.''[1] Today, certified athletic trainers (ATCs) serve a larger and more diverse population than in past years. One population that is included in event coverage is Special Olympics (SO).

As ATCs volunteer their expertise at SO events or by treating athletes in the clinical setting, they find that working with SO athletes is similar in many ways to working with athletes who do not have cognitive developmental delays. Many SO athletes receive their education in the least restrictive environment, where the opportunity for full or partial inclusion in the general primary and secondary school setting exists, with a small percentage participating in high school-sanctioned athletic teams. The same methods of prevention, management, and rehabilitation of athletic injuries used for noncognitively challenged athletes are used for SO athletes. Certain physical conditions, often called comorbidities and hypokinetic diseases, are found commonly in SO athletes as well as in athletes without cognitive developmental delays. The ATCs working with the SO population should be cognizant of the comorbid and hypokinetic diseases and be well prepared for injury management. It is imperative that ATCs recognize and understand the underlying pathologies that are characteristic of the SO population.

Comorbid diseases are accompanying, but unrelated, pathogenic conditions that indicate the coexistence of 2 or more disease processes.[2] An example would be an SO athlete with Down syndrome (DS) who is diabetic and being treated for an ankle sprain. The ankle sprain and diabetes are comorbid conditions; thus, the ATC should have a complete understanding of the pathologic features and considerations of both conditions before initiating treatment. This comorbid condition is managed in SO athletes as in all physically active people with diabetes. Therefore, the purpose of this article is to provide clinical information to health care professionals regarding the SO population.

OVERVIEW OF SPECIAL OLYMPICS

Special Olympics, Inc, is a nonprofit, international program that was developed in the early 1960s to provide year-round sports training and athletic competition for people with mental retardation (MR). Accredited SO programs exist in 150 countries, including all 50 United States and Washington, DC. An estimated 25 000 communities in the US have SO programs. These programs rely very heavily on volunteers to organize and operate the local, regional, state, and world games.[3]

Mental retardation occurs in about 2% to 3% of the population in the United States, affecting 7.5 million people.[3] This condition affects approximately 1 in 10 US families. Worldwide, approximately 3% of the population (156 million people) is affected by MR. Of these, 1 million people participate in SO, and approximately 550 000 athletes participate in the US program.[3]

Table 1. Special Olympics Sports[5]

Alpine skiing	Distance running	Soccer (football)
Aquatics	Equestrian sports	Softball
Athletics (track/field)	Figure skating	Speed skating
Badminton	Floor hockey	Table tennis
Basketball	Golf	Team handball
Bocce	Gymnastics	Tennis
Bowling	Power lifting	Volleyball
Cross-country skiing	Roller skating	Unified sports*
Cycling	Sailing	

*Unified sports combines approximately equal numbers of athletes with and without mental retardation to form sports teams for training and competition at local, state, national, and international events.

Mental retardation is identified before age 18, with characteristics including significantly subaverage intellectual functioning with significant limitations in 2 or more adaptive skill areas. These adaptive skill areas include communication, self-care, home living, social skills, community use, self-direction, health and safety, functional academics, leisure, and work.[4] An example of 2 or more adaptive skill deficits may be deficits in communication with health and safety. For instance, when SO athletes are injured in practice, do they realize that the pain being experienced may be harmful, and can they communicate to someone that they are injured and need help?

To be eligible to participate in SO, athletes must be at least 8 years of age and must be identified by a professional agency as having MR.[3] Other criteria for participation are having a developmental disability with significant learning or vocational problems due to cognitive delay that require specially designed instructions.[3] These criteria for participation align with the definition of MR. Other terms that are synonymous with MR are cognitive disabilities, mental handicaps, and intellectual disabilities.

It is mandatory for all SO participants to have a preparticipation physical examination from a physician or other professional certified to perform physical examinations before competing in any official SO competition. The athletes must participate for 8 weeks in formal sports training and practice sessions before competing in their chosen sport. Further, athletes have the opportunity to train and compete in multiple sports throughout the year. Special Olympics offers 25 different sports, which follow the rules and regulations set forth by the national governing body for each sport (Table 1). Moreover, the SO Rules Committee governs any slight modifications that occur in certain sports.[3]

Coaches are required to be formally certified in SO sports via the SO Skills Course. During this course, coaches are shown new techniques for conditioning, building strength, and teaching athletic skills to help develop highly competitive athletes, regardless of their ability. As coaches learn new techniques, ATCs can use this forum to share their knowledge about strength and conditioning, prevention and management of sport-related injuries, and the need and methods for developing standard operating procedures for events.

COMMUNICATION POINTS FOR SPECIAL OLYMPICS ATHLETES

When working with SO athletes during competition or rehabilitation, health care providers should give SO athletes a primary set of instructions with simplified information regarding their injuries. Certified athletic trainers should make eye contact and speak clearly and directly to the athlete. Language should be concise and spoken at an age-appropriate level when giving instructions to the athlete. Verbal instructions should be short and sequential, and all dialogs should be reviewed with the athlete to ensure that the athlete understands the directions. All motor patterns and activities should be demonstrated by the ATC before asking the athlete to engage in movement. Further, all motor patterns should be reinforced and repeated to allow the athlete to explore his or her kinesthesis to assist in the learning process. Finally, the athlete should be questioned to describe what he or she is being asked to perform.[6] The aforementioned communication skills, with slight modifications, are appropriate for giving instructions to all physically active people.

MEDICAL CONDITIONS ASSOCIATED WITH SPECIAL OLYMPICS ATHLETES

Medical conditions found in people with MR include many of the common hypokinetic diseases, such as overweight and obesity, diabetes, and hypertension.[7] Other conditions identified in the SO population are cardiovascular diseases (congenital and acquired), seizure disorders, vision problems, asthma and allergies, musculoskeletal conditions, joint laxity, and DS.[8] As previously stated, all SO athletes must have a preparticipation physical examination before competition. Past medical history forms with the parent or guardian's signature and physician certification forms must be present at all practices and competitions. During competition, it is common practice in certain states for the athletes to wear some form of identification credential, with codes denoting any serious medical problems. These codes provide a quick reference as to the athlete's underlying conditions. Some state competitions may require athletes to wear wristbands with abbreviated medical information or color-coded dots denoting certain medical conditions. For example, red dots may indicate hypertension or a heart condition, green dots may imply susceptibility to seizures, blue dots may denote the use of multiple medications, and yellow dots may suggest an asthma or allergy condition. The athlete's medical history records still need to be present at all events, as the color codes only indicate nonspecific conditions. For instance, a red dot alerts the medical provider to a heart condition without specifying hypertension or mitral valve prolapse. This coding method should be described fully in the event handbook and the health care professionals' handbook for the particular competition. This coding system should also be a part of the standard operating procedures and should be explained fully, by the medical director overseeing the event, to the medical staff providing coverage.

Overweight and Obesity

It is estimated that approximately one half of all people with MR are overweight, as compared with one third of the general population in the United States.[7] Overweight is defined as 16% to 24% body fat for men and 24% to 31% for women. A person is diagnosed as obese when the percentage of body fat exceeds 25% in men and 32% in women.[9] Athletes who are overweight are at greater risk for developing hypertension, diabetes, and high cholesterol, which can increase the risk for heart disease. Other identified health problems associated with overweight and obesity include an increased psychological burden, a greater risk for cancer, and an increased rate of pre-

Table 2. Characteristics and Symptoms of Type 1 Diabetes Mellitus[10,12,13]

Characteristics
Only 10% of all diabetic patients have type 1 diabetes
Abrupt onset
Onset usually occurs during puberty or after age 40
Genetic predisposition factors for diabetes
General symptoms
Cessation of growth among the young
Excessive urination (polyuria)
Excessive thirst (polydipsia)
Unsatisfied hunger (polyphagia)
Weight loss
Irritability
Drowsiness
Coma
Symptoms of uncontrolled type 1 diabetes
Glucose in the urine (glycosuria)
Excessive levels of glucose in the blood (hyperglycemia)
High levels of ketone bodies in the blood (ketosis)

Table 3. Characteristics and Symptoms of Type 2 Diabetes Mellitus[10,12,13]

Characteristics
Accounts for 90% of diabetic patients
Gradual onset
Usually occurs in people over age 40 and frequently over age 55
Usually occurs in overweight and obese people
Has a higher incidence in African American and Hispanic people than in other ethnic groups
Genetic predisposition factors for diabetes
Symptoms
Fatigue
Urination at night (nocturia)
Excessive thirst (polydipsia)
Weight loss just before diagnosis
Blurred vision
Cuts or bruises that are slow to heal
Tingling or numbness in the hands or feet
Recurring skin, gum, or bladder infections

mature death.[10] As with all athletes, SO athletes who are overweight or obese should be monitored for proper hydration to prevent heat-related illnesses because these individuals' core body temperatures rise more quickly than those of fit individuals.[11] Special Olympics athletes who are taking antiepileptic and psychotropic drugs are at a greater risk for heat-related illnesses because these drugs decrease the body's thermoregulatory capacity. Moreover, these athletes need to be reminded often to continue to hydrate before, during, and after competition and practice. Proper counseling and recommendations for healthier lifestyles should be discussed with athletes, coaches, parents, and guardians during the physical examination. Follow-up measures should be implemented to ensure that proper interventions occur, just as other follow-up measures are implemented for physically active individuals. This process may entail a phone call from the physician or ATC to the parent or guardian or discussion of the progress report during a follow-up visit to the athletic training room, clinic, or office.

Diabetes

Another condition observed in SO athletes is diabetes mellitus. This metabolic disease, in which carbohydrate use is reduced, results in increased use of lipid and protein sources for energy production. Diabetes is caused by an ultimate or relative deficiency of insulin. Normal blood glucose levels should be in the range of 4.4 to 5.6 mmol/L (80 to 100 mg/dL). Low blood glucose levels (hypoglycemia) and high blood glucose levels (hyperglycemia) are levels less than 2.2 to 2.8 mmol/L (40 to 50 mg/dL) and greater than 7.8 mmol/L (140 mg/dL), respectively.[12] Two types of diabetes are common: type 1 diabetes (formerly called insulin-dependent diabetes mellitus [IDDM]) and type 2 diabetes (formerly called non-insulin-dependent diabetes mellitus [NIDDM]) (Tables 2 and 3). Major risk factors associated with type 2 diabetes include a family history, obesity, race, age, previously identified impaired glucose tolerance, hypertension, and significant hyperlipidemia.[10,12,14]

Characteristics of decreased insulin levels include hyperglycemia, glycosuria, water and electrolyte loss, ketoacidosis, and coma. Neuropathy, retinopathy, nephropathy, generalized degenerative changes in large and small blood vessels, and increased susceptibility to infection are long-term complications of this condition.[12]

People with diabetes have delayed wound healing due to the occlusion of arteries and arterioles and the decreased presence of white blood cells. Abnormal chemotaxis and defective phagocytosis in the white blood cells lead to an increased risk of infection. Certain pathogens procreate more rapidly in an environment containing increased sugar levels, which provide excellent energy sources for the infecting organism. Athletes with diabetes who sustain tissue wounds should be monitored closely on a regular basis to ensure that proper tissue healing occurs.[12]

Wound management is essential for all athletes; therefore, it is imperative that athletes with diabetes or any other physical conditions such as DS have properly fitting orthoses and prosthetics to prevent skin irritations. Further, proper-fitting athletic shoes must be worn to prevent blisters or other tissue wounds, which may ultimately lead to severe infections and osteomyelitis. As these athletes grow and mature, regular screenings for proper-fitting footwear and any other orthopaedic devices that may be warranted should be performed during physical examinations to ensure proper compliance.

Exercise has been proven to assist in the management of diabetes by improving diabetic control, assisting in the prevention of obesity, reducing the risk of coronary heart disease, and enhancing psychosocial well being.[13,15] During and after exercise, 2 potential problems exist for athletes with diabetes: hyperglycemia and hypoglycemia. Hyperglycemia occurs when insulin is insufficient to mobilize glucose; thus, glucose levels rise dangerously high. Normal physical activity increases epinephrine levels, which naturally causes an increase in blood glucose. For the athlete who is hyperglycemic, it is essential that blood glucose be monitored regularly to prevent the onset of a diabetic coma.[13,16] The SO athlete may need frequent reminders from the coach or health care professional to monitor blood sugar levels. Some SO athletes may be able to perform their own glucose checks, whereas others may need assistance.

Hypoglycemia can occur when insulin is mobilized too rapidly, producing dangerously low levels of blood glucose.[16] Hypoglycemia can impair judgment and cause loss of coordination, leading to potential injuries. If blood glucose falls below

Table 4. Exercise Guidelines for the Athlete[16]

1. Exercise should begin 1 to 2 hours after meals and before peak insulin activity occurs. Peak insulin levels occur 2 to 4 hours after injection.
2. Insulin should not be injected into primary muscle groups before exercise, as this may cause rapid absorption, resulting in hypoglycemia.
3. Glucose levels need to be measured frequently before and after exercise to determine accurate insulin dosages. Physicians should be directly involved in regulating correct dosages.
4. Insulin injections should be given at least 1 hour before physical activity.
5. Quick-acting carbohydrates (such as juice or candy) should be readily available for the athlete to consume to correct potential hypoglycemia.
6. Regular practice schedules at similar times in the day should be set to assist in the regulation of metabolic activity.
7. Exercise should be avoided during peak insulin activity.
8. Carbohydrate snacks should be consumed before and during prolonged exercise.
9. Proper athletic shoes and fit of shoes are essential during physical activity.
10. Foot hygiene is very important; immediately treat any cuts, blisters, calluses, and signs of infection.

5.6 mmol/L (100 mg/dL), the athlete should consume more carbohydrates before beginning or resuming physical activity. If an athlete's blood glucose level rises above 13.9 mmol/L (250 mg/100 dL), exercise should be postponed until normal glucose levels are attained.[17] Special Olympics athletes may compete on any day and at any time. For example, marathon runners or cyclists competing at 6:30 or 7:00 AM may not have had an adequate breakfast to allow for regulation and stabilization of blood sugar. Therefore, it is imperative that all SO athletes who are diabetic be monitored and evaluated before and after competition. Exercise guidelines for athletes with diabetes are outlined in Table 4.

Down Syndrome and Associated Medical and Orthopaedic Conditions

Down syndrome is a condition that occurs because of the presence of an extra chromosome 21, or trisomy 21.[12] Children with DS are usually smaller than children without this syndrome, and they often have delayed cognitive development. Motor skill and language development also may be delayed. Most people with DS function in the mild to moderate range of MR.[18] Approximately 13% or 65 000 of 550 000 SO athletes are estimated to have DS.[3]

One physical characteristic occurring in approximately 10% to 20% of the DS population is atlantoaxial instability.[18,19] Atlantoaxial instability is caused by laxity of the transverse ligament, which holds the odontoid process of the axis in place on the inner aspect of the anterior arch of the atlas. This ligament assists in maintaining integrity of the C1-C2 articulation. Atlantoaxial instability can also result from abnormalities of the odontoid, including hypoplasia, malformation, or complete absence.[18] All athletes with DS must have a lateral-view radiograph of the cervical region in neutral position, full flexion, and full extension before being cleared to participate.[20] Athletes who have abnormal radiographs are eliminated from contact sports such as diving, gymnastics, floor hockey, and soccer and are limited to noncontact competition such as bowling, swimming, cross-country skiing, figure skating, and distance running. Swimmers who have abnormal radiographs are restricted from starting on the blocks and required to start in the pool.[5]

If cardiopulmonary resuscitation or rescue breathing is necessary in an athlete with DS and atlantoaxial instability, managing the airway may be difficult. Decreased mandibular range of motion, a larger tongue, and a smaller neck length create special airway management concerns in these athletes. Also, tilting the head back to open the airway is not recommended; hence, the modified jaw thrust is indicated because of the laxity of the upper cervical spine.

Other common orthopaedic problems associated with DS are patellar instability, metatarsus primus varus with hallux valgus or varus, pes planus, poor muscle tone, and scoliosis. It is essential to achieve a proper fit for athletic footwear (ie, ice skates, soccer cleats, ski boots, and running shoes), but this fit is hard to achieve because it is difficult to obtain the correct shoe length and width from public shoe and sporting goods stores. Potential problems arise due to the anatomical disorders of the feet, including conditions such as hallux valgus or varus, pes planus or cavus, and insensate feet, which can result in blisters, tendinitis, and other associated overuse or sensory injuries.[19]

Some form of congenital heart disease, including ventricular septal defects, mitral valve prolapse, and aortic regurgitation, is present in 40% to 45% of people with DS.[8,19,21] The SO Medical Advisory Board investigated recommendations for athletes with DS and cardiac conditions and determined that athletes with DS should be examined carefully for the presence or development of aortic regurgitation and mitral valve prolapse before they are permitted to compete.[5] Given the innocuous status of these conditions in the DS population, it is recommended that these athletes be permitted to participate in physical activity.[19] Nevertheless, these conditions necessitate certain interventions and recommendations before an athlete is cleared for participation.

During physical activity, indications of distress in athletes with cardiovascular conditions may include heart palpitations, syncope, lightheadedness, and dyspnea. The coach or ATC should recognize these signs and symptoms quickly and implement first aid management efficiently because these conditions may lead to more serious cardiovascular complications, such as cardiac arrest or cerebrovascular accidents. It is imperative to know which athletes have which medical conditions. Before the competition begins, the medical director should review the medical history forms. As previously noted, these history forms should also be readily accessible on site for reference.

Automated external defibrillators are becoming more and more available in the athletic training setting. It is imperative that ATCs receive training and education in the use of these defibrillators because cardiovascular conditions can affect athletes of all ages and abilities.

Other medical conditions associated with DS are decreased auditory function, vision problems, and obesity.[19]

Vision Problems

Vision problems occur in almost one half of the population with MR. These conditions include astigmatism (37%), refractive errors (49%), nystagmus (30%), strabismus (52%), lenticular opacities (35%), and blepharitis (12%).[22] During the 1995 Special Olympics Summer World Games, a comprehen-

sive vision screening was performed on 905 SO athletes from 70 countries. Visual acuity, refractive error, ocular motor skills, stereopsis, color vision, contrast sensitivity, eye-hand and eye-foot coordination were assessed, and external and internal ocular evaluations were conducted. Among these SO athletes, 30% (272 athletes) wore glasses, 0.6% (5 athletes) wore contact lenses, and only 0.3% (3 athletes) wore American Society for Testing and Materials-approved sports frames. The risk of eye injuries for athletes wearing standard spectacles during contact sports is greatly increased. Therefore, it was strongly recommended that greater preventive measures be taken to ensure that more athletes wear approved sports frames during practice and competition.[23]

Special Olympics athletes who have undiagnosed vision problems are at increased risk for sustaining injuries during practice and competition because of the great demands for eye-hand and eye-foot coordination and body kinesthetics. The combination of the vision deficit and the existing cognitive impairment also affects coordination and kinesthetics and sets these athletes up for a greater chance of injury: for example, a softball player may misjudge a fly ball and sustain a facial injury, a soccer player may miscalculate a header ball and sustain a mild concussion, or a gymnast may sustain a traumatic injury while performing a balance-beam routine.

Seizure Disorders

Seizures are the result of a sudden, explosive, disorderly discharge of cerebral neurons. They are characterized by a sudden, transient alteration in brain function, usually involving motor, sensory, autonomic, or psychic clinical manifestations and an altered level of arousal.[12] The jerky, contraction-relaxation movement associated with seizures is described as a convulsion, whereas epilepsy is defined as a predisposition to recurrent seizures.[24] In the general population, approximately 10% of all individuals will have a seizure during their lives; however, only 2% of the population will develop epilepsy.[14] To date, no epidemiologic studies have been performed to determine the percentage of SO athletes who are seizure prone or epileptic.

There are 3 categories of seizures: absence attacks (petit mal seizures), complex partial seizures (psychomotor seizures), and tonic-clonic seizures (grand mal seizures). Further descriptions of each type of seizure are given in Table 5. Tonic-clonic seizures are the most severe type of seizure. Physical injury can result even if proper precautions are taken. Cervical, clavicular, humeral, trochanteric, and ankle fractures and shoulder and hip dislocations have occurred due to the forceful contractions of the muscles.[13] Causes of seizures include metabolic defects, congenital malformations, genetic predisposition, perinatal injuries, postnatal trauma, motor syndromes, infections, brain tumors, vascular diseases, and fevers (Table 6).

Preventing physical injury is the primary goal in managing seizures. The athlete's head and body must be protected at all times but not restrained. Objects should never be placed in the athlete's mouth as dental health and the airway may be compromised. Certified athletic trainers should ensure that the athlete does not aspirate any foreign material. If a seizure occurs in the water, the athlete's head and trunk should be supported but not restrained. The athlete's head and face must remain above the surface, and an open airway must be maintained at all times. It is important to remove the athlete from the water as quickly as possible and to transport him or her to the hospital for a thorough examination for water ingestion. Moreover, medical providers need to be cognizant that delayed onset of shock can occur from water ingestion.[14]

A single seizure in a previously diagnosed person with epilepsy is usually not treated as an emergency, unless the episode is unusual for that athlete. However, multiple seizures in a short period of time, regardless of previous diagnosis, should be viewed as a medical emergency. If the seizure is a first occurrence, a written description including duration, trigger or onset (if identifiable), and type of seizure should accompany the athlete to the emergency room.[13] After a seizure, the athlete will return to normal consciousness and be very tired; therefore, returning to competition immediately is not recommended. Currently, no uniform protocol exists for all athletes for clearance to return to physical activity. Each local accredited program's board of directors will determine its own protocols.[5] For instance, one county-accredited pro-

Table 5. Characteristics of Seizures[12,13]

Type	Duration	Description
Absence attacks (petit mal)	5–10 s	Blank staring into space for a short time Very mild in nature Cognitive state may change slightly Facial muscles may twitch; eyelids may flutter Onset may occur around age 5 Attacks are most prevalent in childhood
Complex partial (psychomotor)	1–5 min	Disorientation, loss of contact with reality Uncontrolled motor activity in isolated muscle groups such as lip smacking, hand clapping, or wandering about Fidgeting with clothes Person may seem to be drunk, drugged, or psychotic
Tonic-clonic (grand mal)	50–90 s	Sensory phenomena (such as a taste, a sensation, or an aura) before the onset Loss of consciousness Temporary amnesia Loss of bladder and bowel control Intense physical activity may occur after either tonic or clonic convulsions Tonic refers to rigid muscle contractions with no relaxation Clonic refers to repetitive muscle contraction and relaxation in rapid succession Most severe type of seizures

Table 6. Common Precursors to Seizures[12,14]

Hypoglycemia	Ingestion of large amount of water
Fatigue	Constipation
Lack of sleep	Withdrawal from depressant drugs
Emotional or physical stress	Hyperventilation
Environmental stimuli, such as blinking or bright lights, certain music, loud noises, and certain odors	Being startled Use of stimulant drugs Febrile illness Poorly adjusted TV screens

Table 7. Common Prescription Drugs Prescribed to Special Olympics Athletes[26,27]

Drug	Indications	Adverse Effects*
Antidepressant		
Prozac	Depression, mania	Sedation, insomnia, orthostatic hypotension, muscle weakness, GI upset, polyuria, diarrhea
Zoloft		
Nardil		
Norpramin		
Elavil		
Antiepileptic		
Dilantin	Seizure control	CNS depression, drowsiness, ataxia, hypersalivation, GI upset, headache, dizziness, dermatitis
Klonopin		
Phenobarbital		
Tegretol		
Mysoline		
Depakote		
Antipsychotic		
Haldol	Control of psychosis, schizophrenia, psychotic depression, and severe paranoia disorders	Sedation; blurred vision; dry mouth; constipation; orthostatic hypotension; changes in motor involvement such as altered balance, altered posture, and involuntary movements
Moban		
Thorazine		
Zyprexa		
Risperdal		
Antianxiety		
Vistaril	Calming effect	Drowsiness, GI upset, uncoordinated movements, decreased motor performance
Atarax		
BuSpar		
Valium		
Librium		

*CNS indicates central nervous system; GI, gastrointestinal.

gram may require that, after each seizure episode and before returning to physical activity, the athlete be examined by a physician; the neighboring county's accredited program may state that only first seizures require that the athlete be examined by a physician; and the next county's program may not require that the athlete be examined after any seizure.

Common antiepileptic drugs used by both SO and nondisabled athletes include phenytoin, phenobarbital, ethosuximide, primidone, carbamazepine, divalproex sodium, and clonazepam. Adverse effects of these drugs can include reduced function of the thermoregulatory system, fatigue, difficulty concentrating, and impaired coordination or double vision.[14] These adverse effects can affect athletic performance, thus predisposing the athlete to preventable injuries. Many athletes with seizure disorders can participate fully once they are cleared by their physician or neurologist; however, certain athletes may be restricted to noncontact sports in which the risk of physical trauma is decreased.[14] Nakken et al[25] reported that subjects with epilepsy thought that they had better control of their seizures and felt better overall when they engaged in some form of physical activity. As with all athletes, proper nutrition and adequate sleep are essential. Common prescription medications prescribed for athletes with epilepsy, along with their indications and adverse effects, are presented in Table 7.

ATHLETIC INJURIES AMONG SPECIAL OLYMPICS ATHLETES

Only 4 studies have been identified that investigated common injuries sustained by SO athletes. The studies evaluated injuries and illness surveillance during SO summer games held in Michigan, Connecticut, Hawaii, Texas, the United Kingdom, France, and Germany.[28–31] All of the studies revealed that orthopaedic trauma, consisting of the typical sprains, strains, abrasions, lacerations, and fractures, occurred more often than did all other medical conditions combined. The knee was the most often injured joint, followed by the ankle, back, and shoulder.[28,30,31] The other medical conditions documented included heat illnesses, epistaxis, seizures, diabetes, asthma, sunburn, dermatitis, bee stings, and abdominal pain. Sunburn, heat exhaustion, seizures, and abdominal pain were the most recorded medical conditions.[28–31] In 3 of the 4 studies, track and field events and softball events accounted for the greatest number of incidents.[28,29,30] The high incidence of injury may have been a direct result of the greater number of participants competing in these sports than in other sports.

As with all athletic rehabilitation, goal setting is essential during the healing phase for the SO athlete. The final phase of rehabilitation should include sport-specific activities to help recondition the body and prepare the athlete for competition. It is imperative that SO athletes be treated and rehabilitated like noncognitively challenged athletes, with only slight modifications in the presentation of instructions.

CONCLUSIONS

In conclusion, as health care providers volunteer at local, regional, state, and world competitions, they must understand the comorbidities, or compound medical conditions, that affect SO athletes. Moreover, many of the conditions found in SO athletes are identical to those seen in athletes without cognitive delays. As with all injuries or medical incidents, the medical team needs to be able to react quickly and efficiently to provide proper care for these athletes. Further, the medical team is responsible for preventing injuries, as well as managing them. By being a part of the SO games organizing committee medical team, ATCs can provide valuable precompetition information on items such as pre-event meals and standard operating procedures. Certified athletic trainers may also assist

in the development of local medical protocols to ensure that the athletes receive the health coverage and care that they deserve. It is important for all ATCs to remember that working with SO athletes in rehabilitation and reconditioning or covering their events is no different from the ATCs' usual practices. Health care volunteers should prepare themselves well in advance by reviewing the underlying conditions and comorbid diseases that are observed and identified in SO athletes, as well as the prescription medications these athletes take.

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